APPENDIX L
Conservation

Detailed Evaluation of the Most Feasible Alternatives

As stated earlier, following the initial assessment, a detailed evaluation of the identified "best measures" was performed on the most viable for the region from the 51 WCI alternatives and the options with the greatest potential water savings were identified. Subsequently relevant information such as laws, ordinances, and administrative code changes from District rules, and primary data from the region such as housing in each utility service area and the number of hospitality rooms and restaurants was assembled. In order to evaluate these options an analysis of the potential conservation water saving was performed for the most feasible alternatives. These options include conservation for indoor water use, landscape irrigation, commercial and industrial, and the use of reclaimed water.

As previously mentioned, the 2000 KB Water Supply Plan recommended essentially outreach and regulatory methods for encouraging conservation. For the 2005 Plan, the most feasible alternatives were District applied incentive programs, landscape irrigation, commercial retrofit and indoor water use. As noted before, following the initial assessment, a detailed evaluation of the identified "best measures" was performed. Options with the greatest potential water savings were identified; factors that shape the data were collected, such as laws, ordinances and administrative code changes (District rules), age of housing stock, and number and size of restaurants in the KB were considered and analyzed. Finally, an analysis of the methods and water savings were conducted. Funding mechanisms for the recommended alternatives are also discussed in this section.

Agriculture Irrigation Conservation

Citrus is the dominant crop in the KB Planning region. According to 2004 District consumptive use permit data, over 58 percent of the citrus acreage in the planning area is now using low-volume technology or micro-irrigation with the remaining acreage utilizing conventional irrigation methods such as overhead or crown flooding. Conversion of citrus acreage now using flood irrigation could result in significant water savings if converted to micro irrigation.

Since 1992, the United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS) has been promoting water conservation through conversion of flood irrigation systems to low volume technology. The USDA-NRCS has facilitated these conversions by cost sharing, using the Environmental Quality Improvement Program (EQIP). To date there has been limited use of the EQIP program for citrus irrigation conversion in the Kissimmee Basin counties.

Agricultural Best Management Practices (BMPs)

The Best Management Practices (BMP) Programs were developed to help farmers improve water quality. These are voluntary programs developed in cooperation with specific agricultural commodity groups. The commodity groups that presently have BMP programs in place or under development are Cattle, Citrus (Indian River area and Ridge area), Green Industries (landscape, nurseries and golf courses), Horses, Silva-culture (forestry) and Vegetables.

The statewide BMP Program is authorized by Section 403.067, F.S. and the specific authority for the Ridge Citrus BMP Program in Rule 5E-1.023, F.A.C. Section 576.045, F.S, mandates the SFWMD's involvement in the BMP Program. The Ridge Citrus area is located in Orange and Osceola counties, as well as the portion of Highlands County in the Southwest Florida Water Management District.

An example of BMPs for the Ridge Area Citrus is a recommendation for micro irrigation conversion. There has been a moderate level of enrollment in the voluntary program in the KB. **Table 1** shows the percentage of citrus acres enrolled in the program by county and within the Kissimmee Basin Planning Area.

Table 1. Percent Citrus Acreage in the Ridge BMP Program in the Kissimmee Basin Planning Area.

County	Area	Potential Acres[a]	Enrolled Acres	Percentage Enrolled
Glades[b]		0	0	
Highlands[c]	County	42,638	38,994	91%
	KB Area	0	0	
Okeechobee[b]		0	0	
Orange[d]	County	8,095	1,264	16%
	KB Area	4,497	702	16%
Osceola[d]	County	15,273	3,713	24%
	KB Area	14,128	3,435	24%
Polk[d]	County	101,484	45,704	45%
	KB Area	2,537	1,143	45%
Totals	County	167,490	89,676	54%
	KB Area	21,162	5,280	25%

Source: FDACS Notice of Intents Status Reports 2/18/2003

a. Potential Acreage represents Citrus on soil series identified in Rule 5E-1.023 F.A.C.
b. Glades and Okeechobee Counties are not part of the Ridge Area.
c. Excludes Highlands County KB Area because soils defined in footnote "a" are in SWFWMD.
d. The ratio of county to KB area for Orange, Osceola and Polk Counties are defined in DWSA (1998).

One of the major incentives to join the program is a cost sharing arrangement with Florida Department of Agriculture and Consumer Services (FDACS) on implementation costs.

Several state, federal and local agencies are involved in the program. FDACS administers the program. Resource Conservation and Development Corporations and Soil and Water Conservation Districts provide local support for BMP programs. The University of Florida IFAS provided technical expertise nitrogen fertilization rates for the Ridge Citrus BMP Manual. The USDA-NRCS provides technical assistance and some additional cost sharing for the program.

Mobile Irrigation Lab Program

The Mobile Irrigation Lab (MIL) Program began in south Florida in 1989 with an agricultural lab on the Lower West Coast. The mission of the labs is to demonstrate and educate agricultural and urban water users on how to irrigate efficiently. There are currently nine labs operating in 11 of the 16 counties within the SFWMD boundaries. Funding is a multi-agency partnership between federal, state, regional and local levels of government. The agencies currently funding MILs are the USDA-NRCS, the District and the District's Big Cypress Basin Board, various Soil and Water Conservation Districts, the FDACS and various county and local governments. Over the past four years, recommendations for improvements to irrigation systems have yielded average annual potential water savings of 3.35 billion gallons per year. In the KB Planning Area, there is an agricultural lab that provides evaluations in Okeechobee County, but possible irrigation labs for Orange and Osceola Counties are proposed.

Since the research done on agricultural conservation efforts in the Kissimmee Basin counties indicates only partial conversion to more efficient irrigation methods, completion of these tasks would be a prudent effort.

Urban Water Conservation

Utilities in the KB have promoted water conservation through traditional methods, such as public outreach and customer information. The utilities in this region have implemented water conservation requirements of the CUP process as described above, resulting in implementation of water conservation programs and adopted conservation ordinances. A survey of the current conservation efforts employed by the major utility providers was made was conducted. **Table 2** below provides a summary of the inventoried conservation activities.

Several utilities have conducted small-scale retrofit projects. In this Plan, a more detailed analysis of supplementary water conservation practices/projects will be discussed to offer recommendations to expand efforts of the region's water suppliers.

The approach to evaluating the best conservation measures for the KB Planning Area was an iterative one. The evaluation process entailed identifying characteristics of

the planning area, such as age of housing stock, which would lend itself to various opportunities to save water. For example, an appropriate technology for older housing stock is retrofit of indoor plumbing devices (**Table 2**).

Table 2. Examples of Alternatives being Evaluated.

Planning Area Characteristic	Best Opportunity	Conservation Measure
Indoor - Older housing with inefficient indoor plumbing fixtures	Retrofits	Plumbing (e.g., toilets, showerheads, etc.)
Outdoor - irrigation systems that do not respond to rainfall	Retrofits	Rain shut-off switches
New development	Local ordinances/ codes/regulatory measures	Varies from code enforcement to landscape technology, such as Xeriscape™

Indoor Water Use

Two significant changes occurred in plumbing standards in 1983 and 1994, which affected residential water use. In 1983, Chapter 553, F.S., was modified, lowering the maximum allowable flow rates for water fixtures in new construction: a maximum use of 3.5 gallons per flush for toilets and a flow rate of 3.0 gallons per minute (GPM) for showerheads. Prior to this state legislation, the typical volume of water for toilet flushing was 6.0 gallons and showerhead flow was 6.0 GPM.

In 1994, new plumbing standards for water use were implemented under the Federal Energy Policy Act of 1992, setting national plumbing code standards of 1.6 gallon per flush for toilets, 2.5 GPM for showerheads and 2.0 GPM for faucets.

Methodology

In order to determine urban areas with the greatest potential for retrofits in the Kissimmee Planning region, a housing stock analysis was performed using age of housing as a determinate of the age and water use characteristics of plumbing fixtures. County property assessors parcel data for Glades, Highlands, Okeechobee, Orange, Osceola, and Polk counties provided the number and age of residential units.

To determine housing with greater potential for indoor retrofits, age of the residential units was compared to years when the plumbing code changed as described above (pre-1984, 1984-1994, 1994-2000). **Table 3** shows the number of units and percentages of housing in each group for the counties in the planning area.

Table 3. Age of Housing Stock in Kissimmee Basin Counties (Indoor Retrofit).

County	Housing Stock			
	Pre 1984	**1985-1994**	**Post 1994**	**Total**
Glades	763 71%	264 24%	52 5%	1,079
Highlands[a,c]	*384*	*384*	*232*	1,000
Okeechobee	4,312 36%	5,306 45%	2,234 19%	11,852
Orange	21,025 41%	19,060 38%	10,580 21%	50,665
Osceola	20,875 36%	22,234 38%	15,485 26%	58,594
Polk[c]	*1465*	*1462*	*884*	3,811
Sub Total[b]	46,975 38%	46,864 38%	28,351 23%	122,190
Grand Total	48,825	48,709	29,467	127,001

a. Based on analysis of USGS Digital Orthographic Quarter Quad images: dq2811ne, dq2811nw, dq2811se, dq2811sw.
b. Includes Glades, Okeechobee, Orange and Osceola counties.
c. Highlands and Polk percentages based on basin wide average.

Costs and Savings

Utilities that would benefit most from plumbing fixture retrofits are those with significant housing in the pre-1984 age category, and thus have the most potential for indoor water savings.

Although Glades County has the highest percentage of housing stock pre 1984, its small number of homes relative to Orange and Osceola counties, yields a less significant impact for potential water savings. In Orange County, three of seven utilities had a majority of housing stock older than 1984. In Osceola County, three of 10 utilities had a majority of housing stock in their service areas that was older than 1984. For the remaining four utilities, the majority of housing stock in their service areas was older than 1994.

Water savings derived from retrofitting pre-1984 housing to current standards is estimated 4.4 gallons per flush for toilets, and 3.5 GPM for showerheads. Toilets are estimated to be flushed five times a day, with ten minutes per shower as a standard

estimate for each resident. According to the 2000 U.S. Census, the number of persons-per-household was as followed for each county:

- 2.51 in Glades
- 2.30 in Highlands
- 2.69 in Okeechobee
- 2.61 in Orange
- 2.79 in Osceola
- 2.52 in Polk

Therefore, annual savings from retrofitting one unit from the pre-1984 technology to current standards would be 32,000 gallons for each retrofitted showerhead and 20,075 gallons for each retrofitted toilet.

For the purposes of determining amount of potential savings, it is assumed that a retrofit program would include 75 percent of the pre-1984 housing stock. This percentage is normally used as an estimate of operational coverage in any urban retrofit program. Using the county housing age data in **Table 3**, and assuming the 75 percent retrofit, the total potential annual savings of a showerhead retrofit is 0.3 MGD for Okeechobee County, 1.4 MGD for Orange County, 1.5 MGD for Osceola County, and 0.2 MGD for the remaining counties for a total of 3.4 MGD for the planning area.

Similarly, using the housing age data in **Table 3**, and assuming the 75 percent retrofit, total annual savings of a toilet retrofit is 0.2 MGD for Okeechobee County, .0.9 MGD for Orange County, 1.0 for Osceola County, and 0.1 MGD for the remaining counties, for a total of 2.2 MGD for the planning area.

Total annual savings for both toilet and showerhead retrofit is 0.5 MGD for Okeechobee County, 2.4 for Orange County, 2.5 for Osceola County, and 0.3 MGD for the remaining counties for a total of 5.7 MGD. This estimate assumes one retrofit of each device per housing unit.

Costs for toilet retrofits are $200 per retrofit, and $20 per showerhead, as described in the Support Document. Water conservation cost efficiency is expressed in 1,000 gallons of water saved annually. Toilet retrofits cost $.25 per 1,000 gallons of water saved, and showerhead retrofits cost $.06 per 1,000 gallons of water saved.

Whenever indoor water use is reduced, there is also a reduction in wastewater. Wastewater flows have been estimated to be as much as 50 percent of residential water use. Impacts to wastewater treatment facilities and the need for expansion and disposal can be reduced if water use is reduced.

Landscape Irrigation

Methodology

Rain sensor cut-off devised have been demonstrated to be an effective means of reducing wasteful irrigation in automatic systems when local rainfall has met the immediate irrigation requirement. Installing rain sensors in irrigation systems of housing units constructed prior to the 1991 Xeriscape™ Landscaping law, which required rain sensors, as well as Xeriscape™ landscape, would result in the greatest savings. Data for **Table 4** were obtained from county property assessors parcel data as previously described.

Table 4. Number of Pre and Post 1992 Homes in the Kissimmee Basin (Rain Sensor).

County	Housing Stock		
	Pre 1992	Post 1992	Total
Glades	996 92%	83 8%	1,079
Highlands[a,c]	700	300	1,000
Okeechobee	8,799 74%	3,053 26%	11,852
Orange	36,549 72%	14,116 28%	50,665
Osceola	39,174 67%	19,420 33%	58,594
Polk[c]	2667	1144	3,811
Sub Total[b]	85,518 70%	36,672 30%	122,190
Grand Total	88,885	38,116	127,001

a. Based on analysis of USGS Digital Orthographic Quarter Quad images: dq2811ne, dq2811nw, dq2811se, dq2811sw.
b. Includes Glades, Okeechobee, Orange and Osceola counties.
c. Highlands and Polk percentages based on basin wide average.

To determine housing with the greatest potential for outdoor retrofits, age of the housing unit was compared to the law related to rain sensor changes (pre-1992 and post-1992). The percentages of units constructed in the two time periods are described for each county. A 1987 District Survey of Water Use indicated that 70 percent of all residential irrigation in the District is completed by in ground automatic irrigation systems, which are required to have a rain sensor as reflected in the law.

For this evaluation, water savings derived from the retrofit of outdoor systems, namely installation of rain sensors for housing stock built prior to 1992, is estimated. Based on the county housing age data in **Table 4**, and assuming 75 percent of the housing

units are retrofitted, a total savings of 4.9 MGD was estimated for the planning area (0.5 MGD for Okeechobee County 2.0 MGD for Orange County, 2.2 MGD for Osceola County and 0.2 MGD for the remaining counties).

Costs and Savings

Rain sensors can provide a significant reduction in water use for nominal cost. The cost is estimated to average $68 including installation, and can save 27,000 gallons per year, which equates to a cost of $0.25 per 1,000 gallons. The useful life of a rain sensor is estimated to be 10 years. Areas benefiting the most from a rain sensor retrofit program would be pre-1992 housing units with in-ground irrigation systems.

Urban Mobile Irrigation Labs

In the KB Planning Area irrigation audits (evaluations) are purchased from a MIL sponsored by the St. Johns River Water Management District. These evaluations are completed in Osceola County. Plans are being made to start an urban lab in the Orange County area in fiscal year 2005. Mobile irrigation lab personnel evaluate the effectiveness of irrigation systems and then make recommendations on how the system can be made more efficient. The result is savings in water, energy, time and money for the user.

The cost of operating and maintaining an urban lab is approximately $60,000 per year. State and local funding are usually available for these labs. In FY 2002–2006 the SFWMD funded about 40 percent of the total cost of the MIL projects. Local sponsors have supported approximately 10–15 percent of the projects.

Restaurant and Hospitality

Restaurant - Water Savings

The estimation of potential water savings are based on the assumption that a low volume rinse valve will save 77,047 gallons per year (211 gallons per day) and they can be installed on 50 percent of the seated restaurants in Orange and Osceola counties.

Orange County has 1,328 seated restaurants in the Kissimmee Basin planning area, Osceola County has 541 seated restaurants and Okeechobee County has 64 seated restaurants. The planning area counts for seated restaurants in Glades, Highlands and Polk counties are unavailable. However the county totals for restaurants are believed to be small compared to Orange and Osceola counties (78% KB county restaurants are in Orange and Osceola counties).

The savings are 51 MGY (0.14 MGD) for Orange County and 21 MGY (0.06 MGD) for Osceola County for a total 72 MGY (0.20 MGD).

Restaurant - Retrofit Cost

Costs for restaurant rinse valve retrofits are estimated at $80 retrofit, as described in the Support Document. Water conservation cost efficiency is expressed in 1,000 gallons of water saved annually. Rinse valve retrofits cost $.21 per 1,000 gallons of water saved. Whenever indoor water use is reduced, there is also a reduction in wastewater. Impacts to wastewater treatment facilities and the need for expansion and disposal can be reduced if water use is reduced.

Hotel - Water Savings

The estimation of potential water savings are based on the assumption that a low volume shower and faucet retrofit kits are installed in each room. Each kit will save 71 gallons per day per room and they can be installed on 50 percent of the seated restaurants in Orange and Osceola counties.

In 2002, Orange County had 690 hotels, motels and rental condominiums with a total of 85,939 rooms. Osceola County had 3,851 hotels, motels and rental condominiums with a total of 38,061 rooms. Since the county totals for hotels and motels in the other counties are small compared to Orange and Osceola counties it is presumed that the potential savings in these counties will be small. (84% are county hotels and 91% of the rooms are in Orange and Osceola counties).

The savings are 3.06 MGD for Orange County and 1.36 MGD for Osceola County for a total of 4.42 MGD.

Hotel - Retrofit Cost

Costs for hotel retrofits are $20 per retrofit, as described in the Support Document. Water conservation cost efficiency is expressed in 1,000 gallons of water saved annually. Showerhead and faucet retrofits cost $.08 per 1,000 gallons of water saved. The total costs of implementing the hotel retrofit programs for showerheads and faucets is $1,102750 for Orange and Osceola counties in order to achieve the savings presented above.

Conservation – Quantity of Water Potentially Available

Table 5 highlights three examples of public water supply utility characteristics, and a culling of the best-fit water conservation measures recommended for each utility area characteristic.

Table 5. Recommended Measures for Conservation for Planning Region.

Housing Stock Characteristic	Conservation Measure	Water Savings per Retrofit Device	Cost per Device	Cost per 1,000 gallons	Planning Area Savings Based on Retrofit of 75% of Characteristic Housing Stock	Estimated Total Cost of Program to Achieve Savings
Housing Built Before 1984	Showerhead retrofit	3.5 gallons/minute	$20	$.06/1,000	3.4 MGD	$732,368
Housing Built Before 1984	Toilet retrofit	4.4 gallons per flush	$200	$.25/1,000	2.2 MGD	$7,323,683
Pre-1992 Outdoor Irrigation Systems Without Rain Sensors	Rain sensor installation	74 gallons/day	$68	$.25/1,000	4.9 MGD	$4,533,141
Restaurants 50% Retrofit Rate	Low volume spray valve	211 gallons/day	$80	$.21/1,000	0.3 MGD	$201,084
Hotel/Motel 50% Retrofit Rate*	Showerhead and Faucet retrofit	71 gallons/day	$20	$.08/1,000	4.4 MGD	$1,102,750
Planning Area Savings					15.2 MGD	$13,893,026

Table 6 provides a general list of recommended conservation measures that would be effective in different types of utility service areas based on the population growth rate, housing stock and potential for growth.

Table 6. Utility Characteristics and Conservation Methods.

Type of Utility	Characteristics of Utilities	Utility Specific Recommendations
Housing - Large Growth Potential	Considerable existing housing stock of intermediate to old age, significant land available for new development	Indoor retrofits, Xeriscape™ ordinance, irrigation hours ordinance, outreach & education
Housing - Moderate Growth Potential	Existing housing stock intermediate in age, moderate potential for development - limited by boundaries of other utility service areas and natural areas	Indoor retrofits, Xeriscape™ ordinance, irrigation hours ordinance, promote Mobile Irrigation Lab, outreach & education
Housing - Limited Growth Potential	Housing stock is older, service area is near build out, very limited potential for growth	Indoor retrofits, rain switch installation, promote Mobile Irrigation Lab, outreach & education

Conservation – Implementation Strategies

Listed below are potential strategies for water conservation that were developed in cooperation with the public that should be considered in developing plan recommendations regarding conservation.

- Landscape irrigation water conservation has the potential for significant water savings Mobil Irrigation Labs are a demonstrated means of accomplishing this goal and may involve multiple government funding partnerships to minimize costs on local governments.
- Local governments should consider developing ordinances to address water- conserving landscape installation for new construction to maximize water savings in initial design and operation of both residential and commercial sites. The MIL's have demonistrated that intial system design and system maintenance are two of the most important factors in maximizing irrigation efficiency and savings.
- Implement cost effective indoor and outdoor retrofits in the Kissimmee Basin Planning region based on the above analyses.
- Conclude water conservation rulemaking for Chapter 40E-2, F.A.C., and Water Use Basis of Review for Water Conservation Requirements, emphasizing goal-based conservation programs for public water suppliers and major water users.
- Fund projects through the Water Savings Incentive Grant Program, including public/private partnerships, which further the above recommendations.

- Expand outreach and education through funding, public/private partnerships, the media, professional organizations and users.